

## VINYL ACETATE

Vinyl acetate is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 108-05-4



Molecular Formula:  $\text{C}_4\text{H}_6\text{O}_2$

Vinyl acetate is a colorless, flammable, liquid which has a sweet smell in small quantities. It is soluble in ethane, acetone, and chloroform, and miscible with organic liquids. The liquid polymerizes in light to a colorless, transparent mass. It is hydrolyzed by acids and bases (HSDB, 1991).

### Physical Properties of Vinyl Acetate

---

Synonyms: 1-acetoxyethylene; acetic acid ethenyl ester; acetic acid vinyl ester

Molecular Weight:	86.09
Boiling Point:	72 - 73 °C
Melting Point:	-93.2 °C
Flash Point:	-9 °C
Vapor Density:	3.0 (air = 1)
Vapor Pressure:	115 mm Hg at 25 °C
Density/Specific Gravity:	0.932 at 20/4 °C (water = 1)
Water Solubility:	1 g/50 ml at 20 °C
Log/Octanol Water Partition Coefficient:	0.73
Henry's Law Constant:	$4.46 \times 10^{-4} \text{ atm}\cdot\text{m}^3/\text{mole}$
Conversion Factor:	1 ppm = 3.52 mg/m <sup>3</sup>

---

(HSDB, 1991; Merck, 1989; U. S. EPA, 1994a; ECETOC, 1991)

## SOURCES AND EMISSIONS

### A. Sources

Vinyl acetate is used primarily as a monomer for making poly(vinyl acetate) and vinyl acetate copolymers which are used in water-based paints, adhesives, foils, packaging materials, paper coatings or nonwoven binders, and applications not requiring service at extreme temperatures. It is also used in polymerized form for plastic, films, and lacquers; in the production of emulsion paint substances, finishing and impregnation materials, and glue, as a chemical intermediate in the

synthesis of polyvinyl acetate emulsions, resins, polyvinyl alcohol, polyvinyl butyral, and polyvinyl formal; in safety glass interlayers; in hair sprays; and as a chewing gum base (HSDB, 1991).

The primary stationary sources that have reported emissions of vinyl acetate in California are manufacturers of miscellaneous chemical products including adhesive and sealant manufacturers, lumber and wood products manufacturers and manufacturers of concrete, gypsum, and plaster products (ARB, 1997b).

Vinyl acetate was registered for use as a pesticide; however as of January 1, 1987, it is no longer registered for pesticidal use in California (DPR, 1996).

#### B. Emissions

The total emissions of vinyl acetate from stationary sources in California are estimated to be at least 1,800 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

#### C. Natural Occurrence

There is an isolated report of an occurrence of vinyl acetate in trace quantities in watercress plants. Otherwise, it is not known whether vinyl acetate occurs as a natural product (Howard, 1990).

### **AMBIENT CONCENTRATIONS**

No Air Resources Board data exist for ambient measurements of vinyl acetate.

### **INDOOR SOURCES AND CONCENTRATIONS**

No information about the indoor sources and concentrations of vinyl acetate was found in the readily-available literature.

### **ATMOSPHERIC PERSISTENCE**

Vinyl acetate exists in the atmosphere in the gas phase. The dominant atmospheric loss process for vinyl acetate is by reaction with the hydroxyl radical. Based on this reaction, the atmospheric half-life and lifetime of vinyl acetate is estimated to be 10 hours and 14 hours, respectively (Saunders et al., 1994). The expected reaction products from this reaction include formaldehyde (Atkinson, 1995).

### **AB 2588 RISK ASSESSMENT INFORMATION**

Although vinyl acetate is reported as being emitted in California from stationary sources no

health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

## **HEALTH EFFECTS**

Probable routes of human exposure to vinyl acetate are inhalation and dermal contact (Howard, 1990).

**Non-Cancer:** Exposure to vinyl acetate may cause severe irritation to the eyes, throat, and respiratory tract. In general, chronic industrial exposure has been reported to cause chronic bronchitis with impaired ventilating function, central nervous system symptoms (weakness, encephalopathy, and polyneuritis), cardiovascular symptoms (arrhythmias, chest pain, and syncope), liver function changes, and hepatic enzyme induction (HSDB, 1991).

The United States Environmental Protection Agency (U.S. EPA) has calculated a Reference Concentration (RfC) for vinyl acetate of 0.2 milligrams per cubic meter based on nasal epithelial lesions in rats and mice. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects in humans from exposure to vinyl acetate. In one animal study, exposing rats to vinyl acetate by inhalation resulted in fetal growth retardation and minor skeletal fetal defects/variants at the highest exposure level, but this may have been due to maternal toxicity (U.S. EPA, 1994a).

**Cancer:** No information is available regarding the carcinogenic effects of vinyl acetate in humans. In studies where rats have been exposed to vinyl acetate by inhalation, an increased incidence of nasal cavity tumors was observed. The U.S. EPA has classified vinyl acetate in Group C: Possible human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified vinyl acetate in Group 2B: Possible human carcinogen, based on sufficient evidence in animals (IARC, 1995).

